Landsat 7 Processing System (LPS) Transition Plan

July 30, 1996

GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND

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List of TBDs/TBRs

2.2.5 TBD - Need LPS User's Guide Issue Date

2.2.6 TBD - Need LPS O&M Manual Issue date

3.4.1 TBR - EDC to review two ORT phases

Figure 3-1 TBR - EDC to provide schedule for AT and Ops. Support Plan.

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Abstract

This Transition Plan describes the requirements for phasing Landsat 7 Processing System (LPS) implementation activities from development into operations and maintenance. In this respect, this plan defines the responsibilities of LPS Project personnel and their activities required to successfully transition the LPS to Landsat 7 mission operations at the EROS Data Center (EDC). This transition plan also describes the responsibilities of EDC personnel and their activities to support and/or perform LPS transition activities as assigned in this plan.

This document provides an initial understanding of LPS transition planning, preparation, conduct and close-out as envisioned by the Landsat 7 and LPS Projects. This transition plan will be reviewed and negotiated with the LPS operations and maintenance (O&M) organization at EDC in the coming months and updated accordingly to reflect the agreements reached in the joint LPS-EDC review meetings. The LPS transition plan is expected to be baselined approximately 30 days before the delivery of LPS Release 1 to EDC .

Keywords: Landsat 7 Processing System (LPS)
EROS Data Center (EDC)
Transition Plan

Preface

The purpose of this transition plan is to outline and describe LPS transition activities, responsibilities, products and a schedule for accomplishing these.

This Transition Plan is controlled by the Landsat 7 Processing System Project and may be updated by the Document Change Notice (DCN) and/or revision procedures in effect on the LPS Project. Comments and questions regarding this plan should be directed to:

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Section 1 — Introduction

1.1 Purpose

The purpose of this document is to define the transition activities, responsibilities and products required to turn over the Landsat 7 Processing System (LPS) from the Landsat 7/LPS Project at NASA/GSFC to the Landsat 7 operations and maintenance (O&M) organization at the EROS Data Center (EDC). This document also defines specific responsibilities of the LPS Project and EDC O&M personnel for performing and/or supporting LPS transition activities.

1.2 Scope

The scope of this document is limited to the identification of roles, responsibilities, schedules, expectations, and assumptions between NASA and EDC necessary to the transition of the LPS from it's development environment at NASA in Greenbelt, Maryland to the Landsat 7 mission operations environment at EDC in Sioux Fall, South Dakota.

1.3 Landsat 7 Processing System (LPS)

The LPS primarily consists of five hardware strings with external and internal connections. Four of the five LPS strings are required to support the Landsat 7 data capture and Level 0R processing operations. The fifth string is used as a back-up to support Landsat 7 mission operations during LPS contingencies. When not being used as a back-up, the fifth string can be used to support LPS development, test and maintenance activities.

The Software Component of the LPS consists of the following 7 subsystems (major functions):

- Raw Data Capture Subsystem (RDCS)
- Raw Data Processing Subsystem (RDPS)
- Major Frame Processing Subsystem (MFPS)
- Payload Correction Data (PCD) Processing Subsystem (PCDS)

- Image Data Processing Subsystem (IDPS)
- LPS Data Transfer Subsystem (LDTS)
- Management and Control Subsystem (MACS)

Each LPS hardware string is configured with all LPS subsystems. Each LPS string can be set-up to receive and process either the ETM+ Format 1 or Format 2 data. Details on configuring LPS strings and performing LPS functions are contained in the LPS User's Guide (Applicable Document 2.2.5) and the LPS Operations and Maintenance (O&M) Manual (Applicable Document 2.2.6). Detailed information on LPS design are contained in the LPS System Design Specification (Applicable Document 2.2.3) and the LPS Detailed Design Specification (Applicable Document 2.2.4).

1.4 EROS Data Center (EDC)

The Earth Resources Observation Systems (EROS) Data Center is a U.S. Geological Survey (USGS) National Mapping Division data management, systems development, and research field center located near Sioux Falls, South Dakota. The EROS Data Center (EDC) was established in the early 1970's to receive, process, and distribute data from NASA Landsat satellites. EDC currently holds the world's largest collection of space and aircraft acquired imagery of the Earth.

EDC will be the primary site for the reception of real-time and recorded ETM+ imagery from the Landsat 7 satellite. The following Landsat 7 ground system elements and other support systems will be installed at EDC:

- Landsat Ground Station (LGS)
- Landsat 7 Processing System (LPS)
- Image Assessment System (IAS)
- Level 1 Product Generation System (LPGS)
- EDC Distributed Active Archive Center (EDC DAAC)

The USGS at EDC will be responsible for the operation and maintenance of the LPS during the on-orbit mission operations phase of the Landsat 7 mission.

1.5 LPS Transition Objectives

The objectives of LPS transition activities are to:

- Ensure a smooth phase over of responsibilities from the LPS Project (Development) to the EDC Operations and Maintenance (O&M) organization through coordinated transition activities.
- Deliver a well tested and acceptable system (LPS) into the Landsat 7 Ground Segment (GS) configuration and mission operations environment.
- Assure successful operations and maintenance of LPS by well trained EDC O&M personnel after completion of LPS transition.
- Deliver a complete set of as-built LPS documents and configuration and maintenance records to EDC to assure successful operations and maintenance of the LPS during Landsat 7 mission operations.

The features of the LPS transition approach includes:

- Incorporation of LPS transition activities in parallel with LPS development and implementation at EDC.
- Thorough transition planning to meet EDC's expectations for supporting LPS operations readiness, Landsat 7 Project's requirements for mission readiness tests (MRT) and LPS Project schedules.
- Monitoring progress and status of the LPS transition activities to ensure they are complete, accurate and on schedule.

The LPS transition activities will be coordinated by the LPS Project (the development organization at NASA/GSFC) with the Landsat 7 operations and maintenance (O&M) organization at EDC and other Landsat 7 Projects (such as the Landsat 7 Ground Station (LGS), as necessary.

Definitions:

LPS products include items such as documents, hardware and software programs.

LPS activities include installation, training, O&M support, etc.

1.6 LPS Implementation Overview

The LPS will be implemented in two incremental releases: Release 1 and Release 2 for the delivery of the baseline system capabilities as specified in the LPS F&PS and associated ICDs. One or more maintenance releases will follow Release 2 to make corrections as required to support Landsat 7 mission and operations readiness tests (MRT and ORT.) The objectives of the LPS releases are follows:

- The LPS Release 1 will support LPS interface testing with the Landsat 7 Ground Station (LGS), the Image Assessment System (IAS) and the ESDIS LP DAAC, as available

- The LPS Release 2 will meet all LPS functional and performance requirements, described in the baselined LPS Functional and Performance Specification (Applicable Document 2.2.1).

- LPS maintenance releases will provide corrections and enhancements, as required, to support the Landsat 7 System Integration tests (SITs), the Mission Readiness Tests (MRT), and Operations Readiness Tests (ORT).

LPS Release 1, when complete, will be installed on one of the LPS strings for remote access and review by the EDC O&M personnel. Pertinent information regarding remote access and review of LPS Release 1 will be included in the LPS Delivery Agreement Memo.

The LPS Project will conduct a demonstration of each LPS release at its completion. The EDC O&M personnel are invited to attend these demonstrations at the NASA/GSFC site. After completion of a Landsat 7 Project review of the LPS Release 2 capabilities, the LPS Project will submit LPS Release 2 to EDC personnel for conducting a factory acceptance test (FAT) at GSFC. Upon successful completion of the factory acceptance test, as concurred and/or verified by EDC personnel, the LPS Project will ship the as tested LPS to EDC. All five LPS hardware strings and Release 2 software will be shipped to EDC. The LPS Project will install and checkout the LPS in concert with EDC O&M Personnel after it's arrival at EDC. The EDC O&M Personnel will then perform a Site Acceptance Test (SAT) of the LPS. LPS external interface tests with other Landsat 7 systems (LGS, IAS and EDC DAAC) can be conducted during the SAT and/or during the SIT and MRT, as appropriate.

1.7 LPS Transition Overview

The following overview of the transition of the LPS to EDC briefly annotates the three LPS transition phases and what is expected to occur during each phase.

LPS Transition Planning, begins at LPS CDR and ends at LPS Release 1 software delivery. The LPS project will complete all transition planning activities required in the areas of training, facility and installation preparation, and acceptance testing during this phase. The EDC O&M organization will initiate third party training for its staff as necessary.

LPS Transition, begins with the completion of LPS Transition Planning and ends at completion of MRTs. The LPS Project will complete course development and training on the LPS system. EDC O&M personnel assume responsibility for the LPS operations, system administration, and LPS COTS hardware and software.

Transition Close-out, begins with the successful completion of the LPS Transition phase and ends at Launch + 90 days. LPS to turn-over all LPS records and the LPS application software. EDC personnel assume responsible for operating, maintaining and managing LPS configuration in addition to conducting an Operational Readiness Review. LPS Project to continue to review and support maintenance activities performed by the EDC O&M personnel.

1.8 Assumptions

The LPS transition plan is based on the following assumptions:

1. EDC will arrange vendor training courses identified in this plan for EDC O&M personnel.

2. All LPS problems noted will be logged using the Configuration Change Request (CCR) tracking procedure maintained by the LPS Project on the ICAS (Interactive CCR Automation System) tool.

3. The LPS Project PCMB will be responsible for assigning, prioritizing, and approving the resolution of all CCRs until the LPS to EDC Software turn-over.

4. The LPS Project will provide ICAS remote access privileges to the EDC O&M organization for CCR creation and monitoring.

5. EDC becomes responsible for controlling changes to the LPS COTS hardware and COTS software configurations after LPS Site Acceptance Test. The LPS project shall retain CM responsibilities for all LPS developed software until the LPS to EDC Software turn-over.

6. EDC assumes maintenance support for all LPS hardware, software, and firmware items after LPS Site Acceptance Test. It is assumed that EDC Project will organize a Configuration Control broad and the LPS will have representation on it.

7. The Landsat 7 Project is responsible for conducting all system integration and mission readiness tests (SITs and MRTs).

8. EDC O&M personnel are responsible for conducting SITs and MRTs after LPS Site Acceptance Testing at EDC.

9. EDC, with support from Landsat 7 Project, conducts operations readiness test/simulations (ORTs) which culminate into an Operations Readiness Review (ORR) jointly conducted by the Landsat 7 Project and EDC.

10. The LPS project will establish primary points of contact to investigate and resolve trouble calls from EDC through Launch + 90 days.

11. The EDC O&M personnel will allow sufficient privileges to LPS Project personnel to continue to perform LPS software maintenance activities via remote access through Launch + 90 days.

12. After LPS site acceptance test, EDC O&M personnel will normally assign the LPS fifth string to LPS Project personnel for developing, maintaining and testing LPS software. It is understood that during LPS contingencies, EDC operations may preempt the LPS fifth string from LPS Project personnel to recover from LPS failures, to support system integration and mission readiness tests planned by the Landsat 7 Project, and EDC personnel training.

13. The LPS to EDC Software turn-over will occur after Launch and before Launch + 90 days. The intent of this milestone to require EDC O&M personnel to successfully develop, test, and deliver a LPS software release while LPS maintenance personnel are available for consultation.

Section 2 — Applicable Documents

The following documents contain applicable and reference information regarding the LPS, the Landsat 7 system and the LPS transition plan. If there are conflicts between the listed document and the requirements of this plan, the contents of this plan shall be considered to be the superseding requirements.

2.1 Applicable Documents

1. NASA GSFC/MO&DSD, Landsat 7 Processing System Project Management Plan (PMP), Revision 1, May 1995.
2. NASA GSFC/MO&DSD, Landsat 7 Processing Build Implementation Plan (BIP), 514-4BIP/0195, [use approved baseline plan].
3. NASA GSFC/MO&DSD, Landsat 7 Processing System Integration and Test (I&TP), 514-2ITP/0195, August 31, 1995.
4. NASA GSFC/MO&DSD (Code 500), Landsat 7 Ground Data System Master Mission Schedule . [use approved baseline schedules].
5. EROS Data Center (EDC), EDC Site Preparation Plan for the Landsat 7 LGS, LPS and IAS. [use approved baseline plan].

2.2 Reference Documents

1. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Functional and Performance Specification (F&PS), Revision 1, 560-8FPS/0194, July 28,1995.
2. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Operations Concept, Revision 1, 560-3OCD/0194, August 25, 1995.
3. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) System Design Specification, 560-8SDS/0194, May 26, 1995.
4. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Detailed Design Specification, 514-4DDS/0195, November 1995.
5. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) User's Guide, 514-3SUG/0195, **Issue Date - TBD.**

6. NASA GSFC/MO&DSD, Landsat 7 Processing System (LPS) Operations and Maintenance Manual, 514-3OCD/0196, **Issue Date - TBD**.

7. National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) Landsat 7 Detailed Mission Requirements, May 15, 1995.

8. MO&DSD Mission Operations Concept Document for the Landsat 7 Ground System, June 5, 1995.

9. NASA GSFC/MO&DSD, Landsat 7 Ground System Performance Verification Plan (PVP), November 1995.

10. NASA GSFC/MO&DSD, Landsat 7 Ground System Integration and Test Plan (GS I&TP), 510-2ITP/0395, October 1995.

11. GSFC/MO&DSD, Systems Management Policy, MDOD-8YMP/0485, July, 1986.

Section 3 --- LPS Transition Phases and Activities

3.1 LPS Transition Phases

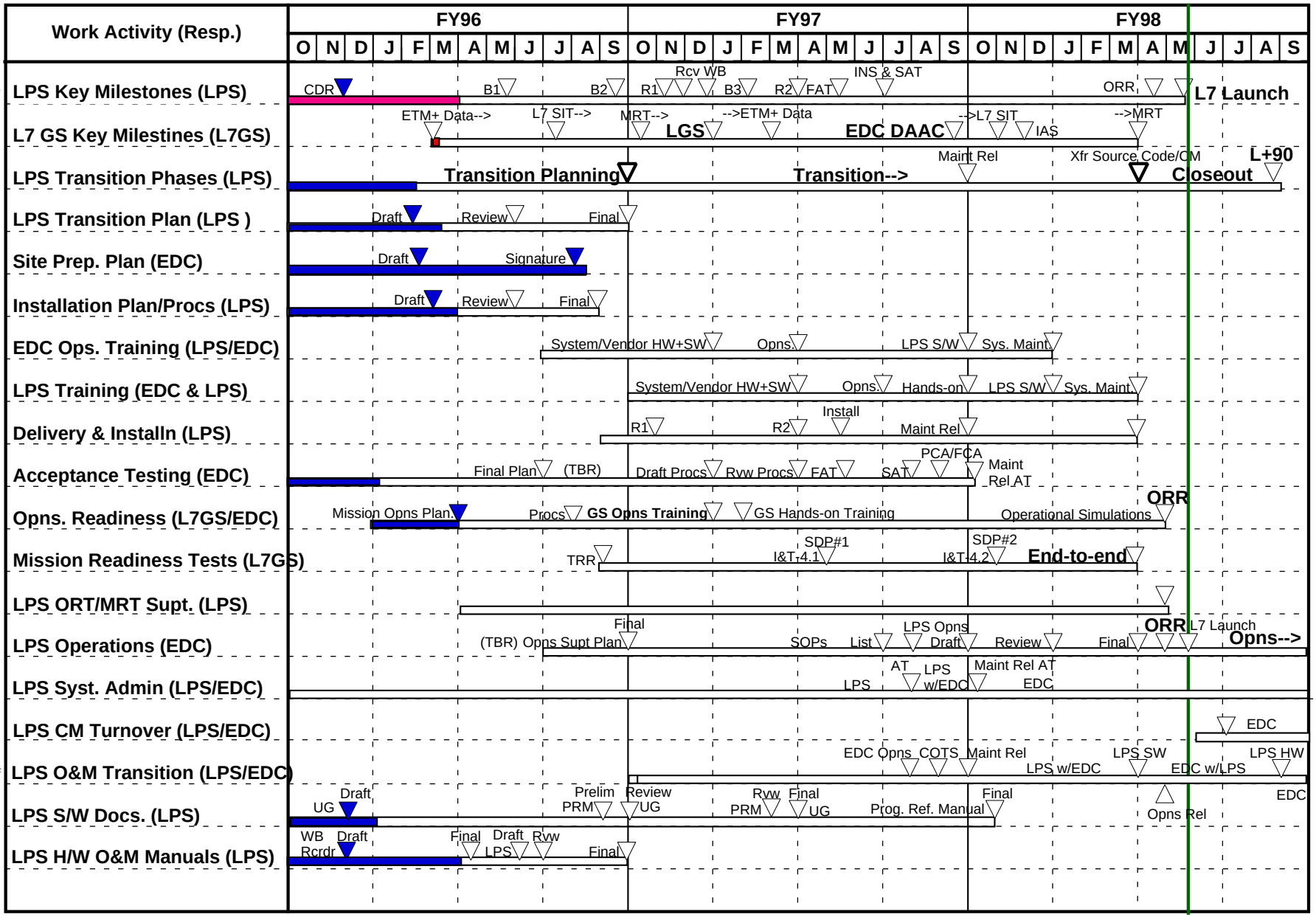
This section defines LPS transition phases and their activities. The LPS transition to operations takes place incrementally in parallel with LPS development and delivery of releases. The LPS Build implementation Plan (BIP) (Applicable Document 2.1.2) defines the individual capabilities of each LPS planned release. The schedule and scope of the LPS maintenance releases will be planned as needed given upcoming tests and CCRs. Figure 3-1 shows a timeline of LPS transition phases and activities based on the LPS implementation plan and derived from the Landsat 7 Ground System Master Mission Schedules (Applicable Document 2.4). The LPS transition activities are divided into three phases:

1) Transition Planning
2) LPS Transition
3) Transition Close-out

The following three subsections provide an overview of the activities performed during each LPS transition phase. Details on LPS transition activities are provided in subsequent sections.

3.1.1 Transition Planning Phase

The LPS transition planning phase encompasses LPS development and system test activities. This phase begins after the LPS critical design review (CDR) and culminates at the delivery of LPS Release 1. All LPS transition planning activities are expected to be complete during this phase. The LPS Transition Plan, Installation plan, and O&M manual, are to be completed by the LPS during this phase. The LPS training activities are begun near the end of this phase. The LPS Acceptance Test criteria, EDC Site Preparation Plan, and EDC Landsat 7 Data Handling Facility Operations Support Plan are available from EDC during this phase. Also, a Mission Readiness Test Plan and procedures will be produced by the Landsat 7 Project.



: LPS Key Transition Activities

Figure 3-1: LPS Transition Schedule

3.1.2 LPS Transition Phase

The LPS transition phase begins at the completion of the LPS Transition Planning (close to the delivery of LPS Release 1) and ends at the completion of Landsat 7 mission readiness tests (MRTs). This is the primary transition activities phase during which LPS system responsibilities are gradually turned over from the LPS Project (the LPS development organization) to EDC (the LPS operation and maintenance organization). A number of LPS transition activities including, LPS training, factory acceptance testing, installation at EDC, site acceptance testing, interface testing with other Landsat 7 systems, integration into Landsat 7 mission operations and transfer of LPS system administration and configuration management responsibilities are completed during this phase. The LPS software source code, programmer's reference manual and maintenance release(s) are also delivered to EDC. The LPS standard operating procedures (SOPs) and maintenance procedures are completed by EDC.

3.1.3 Transition Close-out Phase

The LPS transition close-out phase begins at the completion of the Landsat 7 MRT and ends on day 90 after the Landsat 7 launch (i.e. Launch+90). The EDC O&M personnel becomes responsible for all LPS activities at the start of this phase. The LPS Project switches to a support role to advise EDC personnel in performing LPS operations and maintenance activities. The LPS maintenance plans and prepares all pre-launch and post-launch releases, as deemed necessary, for LPS operations. LPS Project personnel are available to assist EDC O&M personnel in preparing the operational releases and in testing it, if requested by EDC, before delivery to the EDC operations.

The LPS Project also completes the LPS to EDC hand over in addition to turning all LPS records and documents to the EDC O&M personnel during this phase. The EDC O&M organization becomes solely responsible for the LPS at the end of this phase.

3.2 Transition Planning Activities

The following activities are performed during transition planning:

- Training planning and course development
- Facility planning and preparation
- Installation planning and preparation
- Acceptance test planning

The following sections provide additional details on LPS transition planning activities.

3.2.1 Training Planning and Preparation

The LPS Project, under consultation with the EDC O&M personnel, will develop a set of LPS training courses and a schedule to train EDC personnel in the operations and maintenance of the LPS. These courses will be categorized in two groups: vendor training courses available on LPS COTS hardware and software and GSFC prepared courses on LPS developed hardware and software items. It is expected that EDC O&M personnel will complete all arrangements for taking the COTS hardware and software vendor training courses during the LPS Transition Phase. Depending on vendor training schedules, some training could also begin in this (transition planning) phase. The LPS Project recommends that EDC personnel should complete all recommended vendor/COTS training courses during the early part of the LPS transition phase to prepare themselves for taking detailed LPS training courses (developed hardware and software) during the later part of the LPS transition phase. The EDC O&M organization is responsible for arranging LPS Project recommended vendor training courses directly with the LPS COTS hardware and software vendors.

3.2.1.1 Vendor Training Courses

The LPS Project recommends the EDC O&M personnel to take the following vendor training course to support LPS transition activities:

a. SGI Challenge XL System Administration
b. SGI Challenge XL Advanced System Administration
c. SGI Challenge XL Network Administration
d. SGI Onyx Maintenance
e. SGI Introduction to IRIX
f. Oracle Relational Database Administration I (DBA I)
g. Oracle Relational Database Administration II (DBA II)
h. Oracle Relational Database Application Development
i. Oracle Relational Database Tuning and Troubleshooting

j. SGI Onyx Maintenance

The primary objective of EDC personnel in taking these courses is to learn the functional and performance capabilities, and operational features of the various COTS hardware and software items used in LPS implementation. It is possible that some EDC personnel are already trained in the use of the LPS COTS item/products.

3.2.1.2 LPS Operations Training Courses

The LPS Project will prepare and conduct the following courses on LPS operations:

1. LPS System Overview

2. LPS Hardware Familiarization (Basic operation)

3. LPS System Operations Courses:
   a. LPS Management and Control
   b. Landsat 7 Data Capture Operations
   c. Level 0R Processing Operations
   d. Level 0R Data Transfer Operations
   e. Level 0R Reprocessing Operations
   f. LPS Contingency Operations (e.g., string switch over)
   g. Moving Window Display Operations
   i. Manual Operations (**)
   h. LPS string/system readiness Tests

(**) The LPS project will provide recommended guidelines for LPS manual operations. The EDC O&M organization is responsible for developing and establishing Standard Operating Procedure (SOP) for the LPS. The LPS Project will provide review and consulting support to the LPS O&M Personnel in completing the SOPs during the transition phase.

The main objective of LPS operations training is to guide EDC personnel through the detailed steps required to capture, process and deliver Level 0R data to the LP DAAC for a contact period received at EDC. LPS system initialization parameters, error reporting thresholds and error messages will be covered for each step of LPS operations. The LPS nominal and contingency operations will also be covered in these courses.

The LPS Project will use a mix of class room and computer room training sessions to teach these courses. It is expected that all LPS class room training sessions in LPS operations will be complete before the start of LPS Factory Acceptance Testing. The LPS Project will hold informal training sessions to provide hands-on experience to EDC personnel. Early hands-on opportunity to review and exercise limited LPS operation skills

will be available after implementation of LPS Release 1. After LPS FAT, LPS Release 2 will also be available to EDC personnel to exercise limited LPS operations and to prepare for LPS Site Acceptance Testing. See Figure 3-1 for schedule of classes.

The LPS Project will use LPS users guide, operations and maintenance manuals and LPS system and detailed design documents, as appropriate, to prepare the presentation material required for the LPS operations training courses. The LPS Project will not develop and deliver any specially designed/tailored training manuals to be used as additional references during and/or after completion of the training courses.

It is expected that all LPS operations courses, excluding hands-on exercises, can be completed in two 6 hour sessions.

3.2.1.3 LPS Maintenance Training Course

The LPS Project will prepare and conduct the following courses on LPS maintenance:

1. LPS Hardware Maintenance Course (as build design)
    a. LPS Hardware Overview and Components
    b. Ciprico Disk Care and Management
    c. HPDI Overview and Device Driver

2. LPS Software Training Courses (as built design):
    a. Management and Control Subsystem (MACS)
    b. LPS Database
    c. Raw Data Capture Subsystem (RDCS)
    d. Raw Data Processing Subsystem
    e. Major Frame Processing Subsystem (MFPS)
    f. Payload Correction Data (PCD) Processing Subsystem (PCDS)
    g. Image Data processing Subsystem
    h. LPS Data Transfer Subsystem (LDTS)
    i. LPS Software Maintenance (Guidelines and Tools)**

3. LPS Configuration Management Guidelines**

(**) The LPS project will provide recommended guidelines for performing LPS maintenance and configuration management activities. The EDC maintenance organization will be responsible for developing and establishing the formal maintenance procedures for LPS. The LPS Project will provide review and consulting support to EDC personnel in developing these procedures during the transition phase.

The main objective of the LPS maintenance training is to enhance EDC personnel's understanding of the design and construction of the LPS system and hardware and software subsystems for effectively testing and verifying their readiness to support LPS operations. LPS Project personnel, directly responsible for an LPS hardware or software subsystem, will teach these courses. They will conduct one-to-one walk throughs with respective EDC counterparts to discuss the design of each subsystem in detail. The LPS project personnel will also identify and/or describe the various test tools and test data sets which could help EDC personnel in diagnosing and isolating a limited set of problems. The LPS Project will informally deliver these tools (engineering code) and test datasets, developed during LPS implementation, via an unconfigured and/or unbaselined library.

The LPS Project will use a mix of class room and on-line training sessions to review and discuss the design and structure of LPS hardware and software subsystems/components. LPS instructors will develop, discuss and simulate a limited set of test cases to give EDC personnel some live experience in diagnosing and correcting LPS system, hardware and software problems. The LPS Project believes that early involvement of EDC personnel in LPS routine maintenance activities, as shown in the LPS transition schedule in Figure 3-1, is the key to developing LPS maintenance skills. The LPS maintenance training sessions will be held after the LPS AT and completion of the LPS operations courses. The LPS software source code will be delivered to EDC after the completion of LPS maintenance training (close to MRT). All LPS test tools, engineering code and test data, as available and configured, will be delivered informally to EDC.

The LPS Project will use LPS operations and maintenance manuals, the LPS system and detailed design documents and the programmers reference guide to prepare all presentation material required for LPS maintenance training courses. The LPS Project will not develop and deliver any specially designed/tailored training manuals to be used as additional references during and/or after completion of the training courses.

If desired by EDC, EDC personnel will be responsible for arranging and video taping the LPS training courses. It is expected that all LPS Maintenance courses, excluding hands-on exercises, can be completed in four 6 hour sessions.

3.2.2 Facility Planning and Preparation

EDC is responsible for the planning of the LPS area at EDC. The EDC Site Preparation Plan, prepared by EDC, will contain details on the LPS facility design, the LPS equipment layout in the Landsat 7 mission operations area, power, grounding and cooling arrangements, and a schedule for

preparing the facility for LPS installation. It is expected that EDC will complete all LPS facility preparations at least two weeks before the LPS Factory Acceptance Test and will conduct a facility readiness review for the LPS Project. This will allow LPS Project to update LPS installation drawings and procedures in accordance with the as built facility and/or facility changes, if any. The LPS facility planning and preparation schedule is shown in Figure 3-1.

3.2.3 Installation Planning and Preparation

The LPS Project is responsible for planning the installation of LPS at EDC. The LPS installation plan outlines the installation activities to be performed by LPS Project personnel for installing all 5 LPS strings in the Landsat 7 mission operations area at EDC. The LPS installation plan will be designed to meet the physical location, power, grounding and cabling requirements and constraints, if any, specified in the EDC site preparation plan for Landsat 7 systems (Applicable Document 2.1.5). All LPS hardware, software and cables to be installed at EDC will be identified in the LPS installation plan. The LPS project will assure that all material and products required for LPS installation are identified and procured during the early part of the LPS transition period. Support and material (such as furniture and storage racks) required from EDC will be identified in this plan. This plan will include equipment checkout procedures (such as start-up, shut-down and installation verification checks/tests) to assure the operational readiness of each LPS string before it is turned over to the LPS O&M organization at EDC. The schedule for LPS installation activities is shown in figure 3-1.

3.2.4 Acceptance Test Planning

The EDC O&M organization is responsible for planning and conducting the LPS factory acceptance test (FAT) at GSFC and the site acceptance Test (SAT) at EDC. The LPS Acceptance Plan will outline EDC's minimum requirements and criteria for accepting the LPS upon delivery and installation at EDC. The EDC O&M organization will review and negotiate LPS acceptance requirements and criteria with the LPS Project during the transition planning phase. It is expected that this plan will be finalized at least three months before the factory acceptance test (FAT). The LPS Project will use the results of the LPS FAT in it's decision to ship the LPS to EDC. Similarly, the LPS Project will use the results of the LPS FAT and SAT, performed by EDC, as the basis for turning over the LPS COTS items administration, operations and specific maintenance responsibilities to EDC. The LPS acceptance activities and schedule are shown in Figure 3-1.

3.3 Transition Activities

The LPS transition phase activities are as follows:

- Review LPS Release 1
- Complete LPS training
- Conduct Factory Acceptance Test (FAT)
- Deliver and Install LPS
- Conduct Site Acceptance Test (SAT)
- Conduct Maintenance Release Test
- Conduct Physical and Functional Configuration Audits
- Mission Readiness Tests (MRTs)
- Operations Readiness Tests (ORTs)
- Provide Testing Support
- Prepare for LPS Operations
- Prepare for LPS Maintenance
- LPS Configuration Management

3.3.1 Review LPS Release 1

The LPS Release 1 will be completed during the early part of the LPS transition phase. The LPS Project will keep LPS O&M personnel informed of the status of LPS Release 1 verification test activities. The LPS Project will conduct a demonstration of the LPS Release 1 capabilities after successful completion of the verification tests. The EDC O&M personnel will be invited to attend this demonstration. Afterward, the LPS Release 1 software will be installed on an SGI Challenge L/XL machine at NASA GSFC. The LPS Project will set-up login accounts for requested EDC O&M personnel for remote access and evaluation of the LPS Release 1 capabilities.

3.3.2 Complete LPS Training

All LPS and vendor training is completed during the LPS transition phase. LPS training requirements and/or recommendations are provided in Section 3.2.1. A high level schedule for LPS training is shown in Figure 3-1. It is expected that all LPS introductory, vendor and operations (class sessions only) training will be completed before the LPS Factory Acceptance Test. The LPS hands-on and maintenance training will be provided after LPS installation at EDC.

The LPS Project will conduct LPS overview and operations training classes once at GSFC for the EDC FAT personnel and a second time, if necessary, at EDC for other EDC O&M personnel, after LPS installation. The LPS Release 1 software will be available for review during the LPS transition phase.

3.3.3 Conduct Factory Acceptance Test (FAT)

After successful System Test of LPS Release 2, EDC O&M personnel shall begin factory acceptance testing of the LPS. The LPS Project will configure LPS strings for LPS FAT and provide system administration and configuration management services as required by the EDC FAT team. All FAT procedures will be developed by the EDC O&M organization. The LPS Project will provide review and consulting support to EDC personnel during the preparation of these procedures. If desired and requested by EDC, the LPS Project will provide EDC selected test data, test procedures and test tools, developed for LPS Release testing, for preparing the LPS FAT procedures.

After completion of the FAT, EDC personnel will review the results with the LPS Project. The EDC FAT team will also consult LPS Project in categorizing the problems encountered during the FAT and logging them into the ICAS problem tracking tool. The LPS Project or EDC AT Team will log these LPS problems using the CCR procedures established on the ICAS. The LPS Project can provide electronic/hardcopies of the LPS FAT problem reports to EDC. Upon successful completion of the FAT, the EDC FAT director will provide his/her concurrence for shipping the LPS to EDC. The LPS factory acceptance test schedule is shown in Figure 3-1.

3.3.4 Deliver and Install LPS

The LPS Project will deliver all five hardware strings and Release 2 software to EDC after successful completion of the Factory Acceptance Test.

The EDC O&M personnel are responsible for receiving the LPS at EDC. The LPS Project will assign personnel to install the LPS as specified in the Landsat 7 EDC Site Preparation Plan and LPS installation plan. A one week period is allocated for completing this installation. The LPS delivery and installation activity schedule is shown in Figure 3-1.

After successful installation and checkout of the LPS, the LPS will be available to support hands-on operations training and to dry run LPS Site Acceptance test procedures. If necessary, the LPS Project will work out a daily schedule with the EDC O&M personnel for sharing the LPS between acceptance test preparation and LPS training activities. It is expected that no more than three 4 hour sessions will be required to complete the LPS hands-on operations exercises. As a general rule, the LPS Site Acceptance test preparation activities will have precedence over LPS training for accessing LPS resources.

The EDC O&M personnel are responsible for assigning an EDC facility person to support and coordinate LPS installation activities of LPS Project personnel throughout this activity.

3.3.5 Conduct LPS Site Acceptance Test

The EDC O&M Personnel will be responsible for conducting a Site Acceptance Test of the LPS in accordance with the acceptance test plan/procedures reviewed and concurred by the LPS Project. The LPS project will assign a representative to attend LPS Site Acceptance Testing and witness the results. The EDC acceptance test director may request the LPS Project representative to review test results during the test and to clarify problems, if any are encountered during the acceptance test. The EDC SAT director will conduct a LPS acceptance test briefing at the end of the Site Acceptance test. All problems encountered during the acceptance test will be categorized and logged by EDC using the LPS problem reporting procedures. The LPS acceptance criteria, described in the LPS acceptance plan, will be used to assess the severity of LPS problems and to decide on the full, partial and/or conditional acceptance of the LPS and/or LPS capabilities (such as data capture and Level 0R processing). A schedule for resolving all problems will be negotiated between the LPS project and the EDC O&M organization after the LPS acceptance test briefing.

At the completion of LPS Site Acceptance test, the EDC operations organization will assume the system administration responsibility for all LPS COTS hardware and COTS software items. The LPS Project will continue to provide consulting system administration support to EDC until the Landsat 7 Operations Readiness Review (ORR).

3.3.6 Conduct Maintenance Release Test

The LPS Project has tentatively planned a LPS maintenance release to deliver corrections to problems discovered during the LPS acceptance test. If required, the LPS Project expects to deliver a maintenance release before the start of operational readiness tests/simulations. A tentative schedule for the LPS maintenance release is shown in Figure 3-1. When delivered, the LPS maintenance release will be acceptance tested by the EDC using acceptance procedures baselined at the beginning of the LPS acceptance test. The LPS maintenance release will be used by EDC to verify that the LPS problems encountered during AT and assigned to this release are satisfactorily corrected by the LPS Project.

3.3.7 Conduct Physical and Functional Configuration Audits

The LPS Project and the EDC O&M organization will conduct a joint physical configuration audit (PCA) and a functional configuration audit (FCA) of the LPS after completion of the acceptance test. The LPS CM representative will be responsible for supporting these audits by the EDC CM representative. The summary results of these audits will be included in the final/formal acceptance records of the LPS. All discrepancies noted during these audits will be logged using the ICAS problem reporting procedures tool.

3.3.8 Mission Readiness Tests (MRTs)

The Landsat 7 Project plans to conduct a number of system integration tests (SITs) and mission readiness tests (MRTs) to assure the integration of the various software releases, hardware configurations, and operations scenarios into the constructions and evolution of the Landsat 7 ground segment (GS). The Landsat 7 MRT schedules are documented in the Landsat 7 ground data system master mission schedule (Applicable Document 2.1.4). A tentative schedule for LPS applicable SITs/MRTs are shown in Figure 3-1.

The LPS participation in the Landsat 7 SITs/MRTs will start with the delivery of LPS Release 1 and end with an end-to-end testing of the Landsat 7 ground segment. During this period, LPS Release 1 will be integrated with LGS and tested for the receive ETM+ wideband data. After LPS Release 2 is successfully developed, the LPS will tested for science data processing and data files delivery to the EDC DAAC. The LPS project will support these tests throughout the LPS to EDC transition. The Landsat 7 Project is responsible for scheduling and coordinating these tests with the LPS, EDC, and all other GS systems.

3.3.9 Operations Readiness Tests (ORT)

The Landsat 7 Ground Segment and EDC are responsible for preparing for and conducting mission operations readiness tests/simulations (ORTs). The Landsat 7 project will prepare mission operations plan and procedures and provide Landsat 7 ground segment (GS) operations training, including hands-on training, to EDC personnel. The Landsat 7 project will conduct operations simulations to help improve the operational skills of EDC personnel, as well as, verify operational capabilities of the integrated ground segment. The LPS/GS operations readiness preparations and simulations will culminate with an operations readiness review (ORR).

The Landsat project, with support from LPS Project, will complete ORT procedures during the LPS transition phase. These procedures may selectively include the LPS procedures used in LPS acceptance tests. The Landsat 7 Project and EDC test directors may also enhance and modify the LPS acceptance test procedures to adapt them to the ORT environment/simulations. The LPS project personnel will provide consultation support to the Landsat 7 Project and EDC throughout operations readiness test/simulation activities. A tentative schedule of Landsat 7 readiness activities, based on the Landsat 7 ground data system master mission schedule (Applicable Document 2.1.4), is shown in Figure 3-1.

The EDC operations personnel will be responsible for conducting LPS operations readiness test (ORT) in coordination with other Landsat 7 systems and external interfaces. The LPS Project personnel will be on-hand to review test results and to support analysis of the problems encountered during ORT. All problems encountered during LPS ORT will be logged using the ICAS problem reporting procedures. The LPS project will also assist EDC in resolving ORT problems, as appropriate.

The LPS Project will assist EDC operations in preparing LPS for using in the operational readiness test environments. At a minimum, these activities will be performed:

- Load operational data bases and verify contents
- Establish and verify operational mission interfaces
- Support end-to-end tests, simulations, and ORT related tests.

3.3.10 Provide Testing Support

The LPS Project will provide LPS testing support starting at LPS acceptance testing through the end of operations readiness test. This

support includes providing reviews of test procedures, LPS preparation for ORT, and review of test results and problems.

3.3.11 Prepare for LPS Operations

The EDC operations organization will prepare an Operations Support Plan and Standard Operations Procedures (SOPs) for normal and contingency LPS operations (TBD). The LPS project will provide consulting support to EDC operations in preparing the Operation Support Plan and SOPs. The EDC operations organization will be responsible for validating and approving all LPS SOPs. A tentative schedule of LPS operations planning activities, based on the Landsat 7 ground data system master mission schedule (Applicable Document 2.1.4), is shown in Figure 3-1.

The LPS Project expects that most EDC operations personnel will have completed introductory courses in LPS system and operations and vendor training courses in COTS hardware and software before the LPS factory acceptance. These training courses are expected to assist EDC operations personnel in effectively preparing for the LPS FAT and in reviewing the installation activities at EDC. With the arrival of the LPS equipment at EDC, the LPS Project will be in a position to begin meeting with EDC operations and maintenance personnel on a daily basis to review the LPS Project activities. These meetings, as a result, will serve as a prelude to LPS transition to EDC operations and maintenance organizations.

The LPS Project plans to turn over the LPS COTS hardware and software administration responsibilities to EDC operations as soon as possible after completion of all vendor training and the completion of LPS Site Acceptance testing (SAT). The LPS Project will continue to provide back-up system administration and consulting support, as required, for all LPS COTS hardware and COTS software until ORR.

3.3.12 Prepare for LPS Maintenance

The EDC O&M personnel are responsible for preparing for LPS hardware and software maintenance to support Landsat 7 mission operations. The EDC maintenance organization will, in accordance with Landsat 7 GS guidelines and/or the LPS maintenance philosophy, prepare the EDC Landsat 7 Data Handling Facility Operations Support Plan and LPS Standard Operating Procedures. This maintenance plan and procedures will define how the EDC maintenance organization plans to procure and/or retain vendor maintenance and software upgrade/licensing agreements, perform in-house maintenance, and stock spares to

maintain all LPS COTS and custom hardware and software items throughout the Landsat 7 mission.

The LPS Project expects that senior EDC maintenance personnel are on-hand to discuss and begin LPS maintenance transition activities soon after the Site Acceptance test. After completion of the LPS physical and functional configuration audits (PCA and FCA), the LPS Project will turn over all COTS products maintenance agreements and/or licensing responsibilities to the EDC O&M Personnel along with LPS system administration responsibilities. The LPS Project will continue to provide back-up maintenance and/or consulting support to EDC on all LPS COTS hardware and software items until Launch + 90 days. The LPS Project will turnover LPS application software to EDC O&M personnel at the LPS to EDC Software turn-over. At this time EDC O&M Personnel become fully responsible for software development, maintenance, and configuration management.

The LPS Project will provide consultation support to the EDCmaintenance organization in drafting a maintenance plan and the corrective and preventive maintenance procedures for LPS. It is recommended that LPS maintenance procedures should be drafted by EDC after completion of all training in LPS COTS hardware and software. The EDC maintenance organization will be responsible for validating and approving all LPS maintenance procedures. A tentative schedule of Landsat 7/LPS maintenance preparation activities, based on the Landsat 7 ground data system master mission schedule (Applicable Document 2.1.4), is shown in Figure 3-1.

3.3.13 LPS Configuration Management (CM)

The LPS will continue Configuration Management of the LPS application software until LPS to EDC software turn-over, i.e. approximately launch plus 30 days. This facilitates rapid software patches, if necessary, by the LPS while permitting EDC O&M personnel to prepare for the software turn-over with out the stress of making mission critical software deliveries. After LPS to EDC software turn-over, EDC maintenance becomes responsible for LPS software maintenance and configuration management. The LPS Project will continue to support EDC, as a back-up and in a consulting role, in the maintenance and configuration management of LPS application software until launch + 90 days.

3.4 Transition Close-out Activities

The LPS transition close-out activities include:

- Attend Landsat 7 ORR
- Review and Support LPS Pre-launch Release
- LPS to EDC Software Turnover

3.4.1 Attend Landsat 7 Operations Readiness Review (ORR)

EDC will conduct an operations readiness review after the completion of Landsat 7 mission readiness and operations readiness tests (MRT and ORT). The LPS Project will support and participate, as required, in the conduct of this review. It is expected that all problems discovered during MRT and ORT are satisfactorily resolved by ORR. If a problem can not be solved by ORR and the problem is deemed mission critical then a work-off plan shall be presented at the ORR.

3.4.2 Review and Support LPS Pre-Launch Release

The LPS Project will make available the LPS software to the EDC maintenance organization on or about the ORR. O&M personnel will have an opportunity to exercise its LPS maintenance and configuration management skills, learned before the ORR. The LPS Project will work with EDC maintenance personnel in the construction of their first release and to ensure that it is successfully delivered to the EDC operations. Additional operational releases if required by LPS operations, will give the EDC maintenance organization sufficient experience and confidence to effectively maintain and manage LPS software without LPS Project support after LPS transition close-out (launch + 90 days).

3.4.3 LPS to EDC Software Turnover

The LPS Project will hold a meeting with the EDC O&M personnel, after the Landsat 7 launch, to turn-over all LPS software and LPS design, development, test, and maintenance records. The objective of this meeting would be to make sure that the EDC organizations have access to and understands the issues, if any, associated with each LPS record item and/or a mission support document. The LPS project will deliver two sets of electronic and two sets of hard copies for the as-built versions of the following LPS documents and/or records:

- LPS User's Guide
- LPS Operations and Maintenance (O&M) Manual

- LPS Programmer's Reference Guide
- LPS Detailed Design Specification (DDS)
- LPS Interface Detailed Description Documents (IDD)
- LPS Data Format Control Book (DFCB)
- LPS ICDs (LGS and IAS)
- LPS factory acceptance test (FAT) results and test data.
- LPS diagnostics and checkout scripts (engineering version as appropriate)
- LPS COTS item maintenance and/or licensing agreements (as appropriate)

The LPS Project will ensure that copies of all LPS records and documents are available to the EDC operations and maintenance organizations during the LPS transition phase. Figure 3-1 shows a schedule for the completion of some of the LPS operations and maintenance documents. The LPS Project recommends that the EDC operations and maintenance organization should provide their comments and corrections, as appropriate, to these documents by the ORR. This will enable the LPS Project in delivering the as-built updated LPS documents to EDC by launch+90 days.

With the turn-over of the LPS records, the EDC maintenance organization will become fully responsible for all LPS maintenance (hardware, software and firmware) with cognizant support from the LPS Project. The LPS Project will continue to provide back-up/consulting support to EDC through 90 days past the Landsat 7 launch.

Abbreviations and Acronyms

IAS	Image Assessment System
ICD	Interface Control Document
DCN	Document Change Notice
EDC	EROS Data Center
EROS	Earth Resources Observation System
ETM+	Enhanced Thematic Mapper plus
FAT	Factory Acceptance Test
F&PS	Functional and Performance Specification
GSFC	Goddard Space Flight Center
ICD	Interface Control Document
LAN	Local Area Network
LTP	LPS Tranistion Plan
EDC DAAC	EDC Distributed Active Archive Center
LPS	Landsat 7 Processing System
LPF	Landsat Processing Facility
Mbps	Megabits per second
MRT	Mission Readinenss Test
MRTT	Mission Readinenss Test Team
ORT	Operational Readiness Test
SAT	Site Acceptance Test
SIT	Satellite Integration Test
TBD	To Be Defined/Determined
TBR	To Be Resolved
TBS	To Be Supplied
TCP	Transport Control Protocol